

Amendment and Response

Applicant: Xiang Dai et al.

Serial No.: 10/612,663

Filed: July 2, 2003

Docket No.: 200308566-1 / H300.211.101

Title: SUPPORTING A CIRCUIT PACKAGE INCLUDING A SUBSTRATE HAVING A SOLDER COLUMN ARRAY

REMARKS

The following remarks are made in response to the Office Action mailed August 8, 2005. Claims 8, 10, 13-17, 20, 21, 23 and 25-29 were rejected. With this Response, claims 8, 10, 15, 17, and 28 have been amended. Claims 8, 10, 13-17, 20, 21, 23 and 25-29 remain pending in the application and are presented for reconsideration and allowance.

Claim Rejections under 35 U.S.C. § 103

In the Office Action, claims 8, 10, 13-17, 20, 21, 23 and 26-28 were rejected under 35 U.S.C. §103(a) as being unpatentable over Chuang et al. U.S. Patent Publication 2004/0036162 (the Chuang Publication).

Applicant's amended independent claim 8 includes the limitation that each support is disposed on the printed circuit board at each corner of the integrated circuit package underneath the lid of the integrated circuit package to extend between the lid and the printed circuit board.

In contrast, the Chuang Publication discloses that a spacer (560, 760) is disposed on top of a substrate (510, 710) between the substrate (510, 710) and a heat sink (550, 750), as shown in Figures 5 and 7 of the Chuang Publication (see Column 3, Paragraph 30 and other Figures apparently demonstrating this arrangement), and is not disposed on a printed circuit board (570, 770).

Accordingly, in the Chuang Publication the spacer (560, 760, etc.) does not extend between any portion of chip (500, 700, etc.) and the heat sink (550, 750, etc.) and the printed circuit board (570, 770, etc.) and therefore the Chuang Publication fails to disclose a support disposed on a printed circuit board and underneath a lid of an integrated circuit package, the support extending between the lid and the printed circuit board, as claimed by Applicant in claim 8.

In addition, Applicant's amended independent claim 8 also includes the limitation that the integrated circuit package includes a lid that extends directly from the substrate outwardly over an edge of the substrate in both a first assembled state and a second final assembled state of the system.

In contrast, the Chuang Publication discloses chip (500, 600, 700, etc.) but does not disclose a lid associated with its chip. In particular, the Chuang Publication does not have

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any structure corresponding to or equivalent to a lid of an integrated circuit package that extends directly from a substrate of the integrated circuit package, as claimed by Applicant in claim 8.

In further contrast to Applicant's amended independent claim 8, the Chuang Publication fails to disclose a heat sink secured on top of the lid of the integrated circuit package via a compressive force with the lid being separate from and independent of the heat sink. In the Chuang Publication, as described above, there is no structure equivalent to Applicant's lid. Moreover, for the reasons stated below, the lid of an integrated circuit package is not generally interchangeable with a heat sink, as generally asserted in the Office Action.

Applicants respectfully submit that the assertion in the Office Action regarding a "one piece construction" for the lid and the heat sink is misplaced. An integrated circuit package is generally manufactured according to semiconductor manufacturing techniques used to make an electrically active integrated circuit packages, with these techniques generally not corresponding to manufacturing an electrically passive heatsink. Accordingly, one cannot simply omit a lid from an integrated circuit package in order to re-engineer a heat sink. Accordingly, the assertion of a "one piece construction" in the Office Action is not supportable by the underlying technology and real-world commercial practices relating to the subject matter of Applicant's claim, in which heat sinks are not generally interchangeable with lids of integrated circuit packages as effectively asserted in the Office Action.

In addition, this "one-piece construction" assertion assumes away an entire limitation of Applicant's claim, and ignores Applicant's specification and drawings which supports the claim limitation of the lid extending directly from substrate of the integrated circuit package. See Applicant's Figures 2-5. As apparent throughout Applicant's claims, specification, and drawings, the lid of the integrated circuit package is not a "throw away" limitation because it enables the unique application of the claimed supports being directly positioned on a printed circuit board underneath the lid and alongside the substrate of the integrated circuit package, which the Chuang Publication's heat sink (550, 750) does not enable.

The claims are to be examined as to what the Applicant regard as the invention (MPEP 2172). Applicant's respectfully submit that the claims have been improperly rewritten in hindsight in the Office Action, effectively removing a limitation of Applicant's

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claims, to make application of a reference (the Chuang Publication) more convenient. Accordingly, Applicant respectfully requests that the limitation of the lid of integrated circuit package be treated, as claimed by Applicant.

Applicant's amended independent claim 8 also includes the limitation of that the second assembled state of the system is a second, final assembled state of the system, which directly corresponds to a product claim. Accordingly, the differences explained above demonstrating the patentable differences of Applicant's limitations over the Chuang Publication do fully apply as a product claim (rather than product-by-process) because these limitations are present in the second, final assembled state of the system

Applicant's amended independent claim 8 also includes the limitation that each support comprise a body and a pair of wings extending generally perpendicular to the body for extending underneath the lid of the integrated circuit package and the body extending outwardly in a generally opposite direction from the wings.

Applicant respectfully submits that the assertion in the Office Action (apparently based on MPEP 2144.04, Section IV, A at page 2100-140, which lists the cases cited in the Office Action) regarding the "dimensional limitations" of Applicant's claimed supports does not fully address the limitations of Applicant's amended independent claim 8 regarding the support(s).

Applicant's amended independent claim 8 includes limitations that define a spatial, structural relationship of a structure via the positional relationship between different portions (e.g., a body and a pair of wings) of each support, thereby specifying much more than mere dimensional limitations (e.g., length, height, etc.) of a component. This spatial and positional relationship of the body and the wings of each support provides specific functions not disclosed in the Chuang Publication. The body of the support enables securing the support relative to the printed circuit board via a fastener at a location spaced away from the integrated circuit package so as not to interfere with conductive traces on the printed circuit board extending from the sides of the integrated circuit package. See Applicant's specification at page 5, lines 18-22 and Figures 2-5. The wings enable robust support at each corner of the integrated circuit package underneath the lid of the integrated circuit package, thereby enabling support of the lid of the integrated circuit package via their position between the printed circuit board and the lid of the integrated circuit package. See Applicant's

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specification at page 5, lines 12-13 and Figures 1-5. The wings of the support also enable the support to be positioned alongside the substrate of the integrated circuit package (Figures 2-5), rather than on top of a chip, as in the Chuang Publication.

Accordingly, the assertion in the Office Action regarding “dimensional limitations” of Applicant’s claimed supports ignores a valid limitation of Applicant’s claim that meaningfully distinguishes the Chuang Publication, which was admitted in the Office Action as failing to disclose Applicant’s claimed limitations regarding the supports.

For these reasons, the Chuang Publication fails to teach or suggest independent claim 8, and therefore Applicant’s independent claim 8 is patentable and allowable over the Chuang Publication. Dependent claims 10, 13-14, 21, 23, and 25 are also believed to be allowable as they further define patentably distinct independent claim 8.

For substantially the same reasons presented for the patentability of claim 8, and for additional reasons, the Chuang Publication fails to disclose Applicant’s claim 15 directed to an electronic component system.

In particular, in contrast to the Chuang Publication, in Applicant’s claimed system the means for performing circuit functions includes, among other things, a second means disposed on top of a substrate and extending from the substrate outwardly beyond the substrate for translating a compressive load to a means for carrying circuit components, as specified in claim 15. The Chuang Publication does not include a structure or function corresponding to a second means for translating as chip (300, 400, etc.), and for the reasons explained in association with Applicant’s amended independent claim 8, the heat sink (550, 750) in the Chuang Publication does not provide this structure.

In addition, in Applicant’s claimed system of claim 15, the support means is removably attachable directly on the means for carrying circuit components and is interposed between the second means for translating and the means for carrying circuit components.

In contrast, the Chuang Publication discloses that a spacer (560, 760) is disposed on top of a substrate (510, 710) between the substrate (510, 710) and a heat sink (550, 750), as shown in Figures 5 and 7 of the Chuang Publication (see Column 3, Paragraph 30 and other Figures apparently demonstrating this arrangement), and is not disposed on a printed circuit board (570, 770).

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Accordingly, in the Chuang Publication spacer 560, 760 does not extend below any portion of chip (300, 400, etc.) and does not extend between any portion of chip (300, 400, etc.) and printed circuit board 570,770 and therefore does the Chuang Publication fails to disclose the support means being removably attachable directly on the means for carrying circuit components and being interposed between the second means for translating and the means for carrying circuit components, as claimed by Applicant in independent claim 15.

For these reasons, the Chuang Publication fails to teach or suggest independent claim 15, and therefore Applicant's independent claim 15 is patentable and allowable over the Chuang Publication. Dependent claims 16, 26 and 27 are also believed to be allowable as they further define patentably distinct independent claim 15.

For substantially the same reasons presented for the patentability of claim 8, and for additional reasons, the Chuang Publication fails to disclose Applicant's claim 28. First, as previously presented, the Chuang Publication fails to disclose Applicant's claimed system comprising, among other things, a lid that extends directly from the substrate of an integrated circuit package with the lid including an extended portion that extends outwardly over an edge of the substrate, as claimed by Applicant in independent claim 28.

In further contrast to the Chuang Publication, Applicant's claimed system in claim 28 comprises, among other things, a single band sized and shaped to surround and contact all of the supports and apply a lateral force against the wing portions and the corner of the supports to secure the supports in position underneath the extended portion of lid of the integrated circuit package and to maintain the supports in position relative to the printed circuit board.

Instead, the Chuang Publication discloses a moat (410 in Figure 4C) to secure its spacers (560, 760, etc.) relative to substrate (510, 710) and/or relative to heat sink (550,750, etc.) but does not disclose a single band that applies a lateral force to maintain the supports in proper contact and position underneath a lid of an integrated circuit package, as claimed by Applicant in independent claim 28.

For these reasons, the Chuang Publication fails to teach or suggest independent claim 28, and therefore Applicant's independent claim 28 is patentable and allowable over the Chuang Publication. Dependent claim 29 is also believed to be allowable as it further defines patentably distinct independent claim 28.

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For substantially the same reasons presented for the patentability of claims 8 and 28, the Chuang Publication fails to disclose Applicant's independent claim 17. In particular, the Chuang Publication fails to disclose a shim sized and configured to be insertable underneath the lid of the column grid array package and, configured for securing directly on the printed circuit board, as claimed by Applicant in claim 17.

Second, for substantially the same reasons previously presented in association with Applicant's independent claim 8, the Chuang Publication fails to disclose a support as a shim configured to be secured directly on a printed circuit board underneath and in contact with a lid of an integrated circuit package, as claimed by Applicant in claim 17.

Third, the Chuang Publication also fails to disclose, as claimed in Applicant's independent claim 17, a support comprising: (1) a shim including a pair of wing portions that are generally perpendicular to each other and joined together at one end to define a corner, and wherein the wing portions of the shim are in contact with and support the lid of the integrated circuit package in an assembled state of the system; and (2) a single band sized and shaped to surround and contact the shim and apply a lateral force against the wing portions and the corner of the shim to secure the shim in position underneath the lid of the integrated circuit package and to maintain the shim in position relative to the printed circuit board.

As previously explained in association with claim 8 and claim 28, respectively, the Chuang Publication fails to disclose these features, each of which are specified in Applicant's amended independent claim 17.

For these reasons, the Chuang Publication fails to teach or suggest independent claim 17, and therefore Applicant's independent claim 17 is patentable and allowable over the Chuang Publication. Dependent claim 20 is also believed to be allowable as it further defines patentably distinct independent claim 17.

In the Office Action, claims 25 and 29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Chuang Publication as applied to claims 8 and 28 and further in combination with Verma et al. U.S. Patent 6,407,450 (the Verma Patent).

The Verma Patent fails to cure the deficiencies of the Chuang Patent Publication.

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Accordingly, for the reasons previously presented regarding the patentability of independent claim 8, from which claim 25 depends, and regarding the patentability of independent claim 28, from which claim 29 depends, the Chuang Publication as modified by the Verma Patent fails to disclose Applicant's dependent claims 25 and 29, respectively.

For these reasons, the Chuang Publication and the Verma Patent, alone or in combination, fail to teach or suggest dependent claims 25 and 29, and therefore Applicant's dependent claims 25 and 29 are patentable and allowable over the Chuang Publication and the Verma Patent.

In light of the above, Applicants respectfully request withdrawal of the rejection of claims 8, 10, 13-17, 20, 21, 23 and 25-29 based on the Chuang Publication and/or the Verma Patent, respectively, under 35 U.S.C. §103.

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CONCLUSION

In view of the above, Applicant respectfully submits that pending claims 8, 10, 13-17, 20, 21, 23 and 25-29 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 8, 10, 13-17, 20, 21, 23 and 25-29 is respectfully requested.

No fees are required under 37 C.F.R. 1.16(b)(c). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 50-0471.

The Examiner is invited to contact the Applicant's representative at the below-listed telephone numbers to facilitate prosecution of this application.

Any inquiry regarding this Amendment and Response should be directed to Paul Grunzweig at Telephone No. (612) 767-2504, Facsimile No. (612) 573-2005. In addition, all correspondence should continue to be directed to the following address:

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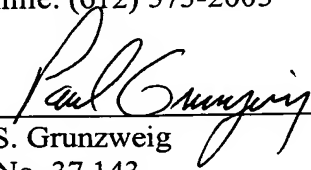
Respectfully submitted,

Xiang Dai et al.,

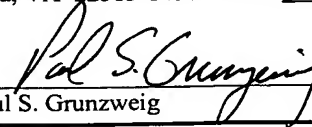
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CERTIFICATE UNDER 37 C.F.R. 1.8: The undersigned hereby certifies that this paper or papers, as described herein, are being deposited in the United States Postal Service, as first class mail, in an envelope address to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 8th day of November, 2005.

By 
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